

Conjugated Linoleic Acid (CLA) Content of Milk From Cows Offered Diets Rich in Linoleic and Linolenic Acid

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Introduction

CLA is a fatty acid found primarily in the meat and dairy products of ruminant animals. It is produced by rumen bacteria and differs from linoleic acid (9 cis, 12 cis) by having a conjugated double bond with a 9 cis, 11 trans configuration. Studies with laboratory animals have demonstrated that CLA has anticarcinogenic properties, reduces atherosclerotic risk, and can alter body composition in the direction of reduced fat-increased lean. The objective of this study was to study the effect of diet on CLA content of milk.

Materials and Methods

Two experiments were conducted to determine CLA content of milk from cows offered diets rich in linoleic and linolenic acid. In Expt. 1, thirty-six cows were divided between control (CTL) and five treatment groups. Cows in the CTL group received a diet containing 34% alfalfa silage, 17% corn silage, 31.9% high moisture ear corn, 15.5% soybean meal and 1.6% minerals and vitamins (DM basis). In the treatment groups dietary corn and soybean meal were partly replaced by either 18% raw cracked soybeans (RS), 18% roasted cracked soybeans (RSB), 3.6% soybean oil (SO), 2.2% linseed oil (LO2), or 4.4% linseed oil (LO4) on a DM basis. Experimental diets were fed for 5 weeks.

In Expt. 2, thirty-six cows were assigned to control (CTL) and five treatment groups. Cows in the CTL group received a diet containing 37% alfalfa silage, 18% corn silage, 28.6% high moisture ear corn, 14.8% soybean meal and 1.6% minerals and vitamins (DM basis). In the treatment groups, dietary corn and soybean meal were partly replaced by either soybean oil at 0.5% (SO), 1% (SO1), 2% (SO2), or 4%

(SO4) of diet DM, or linseed oil at 1% (LO1) of diet DM. Experimental diets were fed for 4 weeks.

Results and Discussion

Experiment 1

Average CLA contents in milk fat from wk 2 through 5 were 3.9^d, 3.9^d, 7.7^c, 21.2^a, 15.9^b and 16.3^b mg/g of fatty acids in the CTL, RS, RSB, SO, LO2, and LO4 groups, respectively. Feeding unheated full-fat soybeans had no effect on milk CLA content, whereas roasting the soybeans resulted in a small increase in CLA content. It is not clear why roasting should have this effect. Feeding of the free oil was by far the most effective way to increase milk CLA content.

Experiment 2

Average CLA contents in milk fat during wk 2 through 4 were 5.0^d, 7.5^c, 7.6^c, 14.5^b, 20.8^a and 7.3^c mg/g of fatty acids in the CTL, SO, SO1, SO2, SO4 and LO1 treatments. Soybean oil and linseed oil are good sources of linoleic and linolenic acid, respectively. Linoleic acid is a known precursor of CLA. While linseed oil contains some linoleic acid, the relatively high milk CLA concentrations obtained with feeding of linseed oil suggests that linolenic acid may also be a substrate for CLA synthesis.

Summary

Conjugated linoleic acid content of milk fat can be increased by offering diets rich in linoleic or linolenic acid, but only when oil is readily accessible to the rumen organisms. It remains to be demonstrated if the enhanced levels of CLA in milk, achieved through manipulation of the cow's diet, are sufficient for improving health status of people consuming dairy products.